

Bibliographie & Ressources

Classement thématique / chronologique.

Entrée en matière

Wikipédia, entrée “History of numerical weather prediction”.

<http://en.wikipedia.org/wiki/History_of_numerical_weather_prediction>, [accédé le 12 septembre 2012].

Definition from Wikipedia, the free encyclopedia.

Ouvrages

Numerical Weather Prediction. Jesse Russell, Ronald Cohn. Book on Demand, 2012, 80 p. ISBN-13: 978-5510541380.

“High Quality Content by WIKIPEDIA articles. Numerical weather prediction uses mathematical models of the atmosphere and oceans to predict the weather based on current weather conditions. Though first attempted in the 1920s, it was not until the advent of computer simulation in the 1950s that numerical weather predictions produced realistic results. A number of global and regional forecast models are run in different countries worldwide, using current weather observations relayed from radiosondes or weather satellites as inputs to the models.”

Les bases de la prévision numérique du temps. Coiffier, Jean. Météo-France, 2009, 255 p. ISBN 978-2-11-097446-4.

“Les modèles numériques sont aujourd'hui des instruments indispensables dans le domaine des sciences de l'environnement, en particulier dans celui la prévision météorologique ou climatique. Cet ouvrage expose les bases de la prévision numérique du temps et décrit les techniques couramment utilisées pour construire les modèles d'atmosphère. [...]”

Disponible Service IST Inria

Atmospheric science : an introductory Survey. John M. Wallace, P. V. Hobbs. Academic Press, 2006, 504 p. ISBN-13: 978-0127329505.

“Atmospheric Science, Second Edition, has been completely revamped in terms of content and appearance. It contains new chapters on atmospheric chemistry, the Earth system, climate, and the atmospheric boundary layer, as well as enhanced treatment of atmospheric dynamics, weather forecasting, radiative transfer, severe storms, and human impacts, such as global warming. The authors illustrate concepts with colorful state-of-the-art imagery and cover a vast amount of new information in the field. They have also developed several online materials for instructors who adopt the text.”

Fondamentaux de météorologie : à l'école du temps. Malardel, Sylvie. Cépaduès, 2005, 708 p. ISBN 2-85428-631-6.

“Cet ouvrage présente les bases techniques et scientifiques de la météorologie de ce début du XXI e siècle. Il permet à des lecteurs intéressés par la météorologie et possédant une culture scientifique générale d'aborder les connaissances classiques dans le domaine de la physique de l'atmosphère exposées avec un souci pédagogique permanent. Il présente également un état de l'art des principaux modèles conceptuels fondés sur des résultats de publications scientifiques récentes ainsi que les techniques actuelles d'observation et de prévision numérique du temps [...].”

Disponible Service IST Inria

An introduction to dynamic meteorology. Holton, James R. Elsevier Academic Press, 2004, 535 p. ISBN 0-12-354016-X.

« This revised text presents a cogent explanation of the fundamentals of meteorology, and explains storm dynamics for weather-oriented meteorologists. It discusses climate dynamics and the implications posed for global change. The Fourth Edition features a CD-ROM with MATLABo exercises and updated treatments of several key topics. Much of the material is based on a two-term course for seniors majoring in atmospheric science.”

Disponible Service IST Inria

The Ceaseless Wind : An introduction to the Theory of Atmospheric Motion. John A. Dutton. Dover Publications, 2002, 617 p. ISBN 0-486-49503-5.

“Corrected and enlarged republication of the work first published by the McGraw-Hill Book Company, New York, 1976, and first republished by Dover Publications, 1986. This acclaimed hardcover text--recognized by teachers throughout the world as the best of its kind--provides advanced undergraduate and graduate students with an integrative presentation of the important concepts of the theory of atmospheric motion. [...] The book is divided into three parts: Foundations of Atmospheric Dynamics, The Equations of Atmospheric Motion, and the Theory of Atmospheric Motion. A chapter new to this edition presents a unified approach to approximate equations of motion for various scales of flow, examines the topological dynamics of spectral models and introduces the concept of metamodeling.”

Disponible Service IST Inria

Dynamique de l'atmosphère et de l'océan. P. Bougeault, Robert Sadourny. Ecole Polytechnique, 2001, 297 p. ISBN-13: 978-2730207775.

“La démarche consiste à mettre à la portée d'un lecteur ne disposant que d'un bagage mathématique restreint (les équations aux dérivées partielles linéarisées) des modèles simplifiés qui permettent d'analyser l'essentiel des effets physiques responsables des propriétés particulières des écoulements géophysiques. Il présente le mouvement de l'atmosphère et de l'océan, tel que nous le révèlent les observations effectuées en routine par les instituts météorologiques, les satellites, et les navires océanographiques, introduit les équations de base de la mécanique des fluides, dans l'approximation de Boussinesq, qui sera utilisée dans tout l'ouvrage, les caractéristiques particulières des écoulements géophysiques (stratification, rotation), introduit le modèle de Saint-Venant, un prototype simple des écoulements géophysiques qui ouvre la voie à de nombreuses applications, comme l'étude des ondes de marée. Puis aborde les écoulements quasi-géostrophiques, discute la propagation des ondes de Rossby et le phénomène d'instabilité barocline, à l'origine des perturbations météorologiques des latitudes tempérées. [...] Enfin, le dernier chapitre discute les effets du couplage entre l'océan et l'atmosphère, notamment en zone tropicale, et présente quelques aspects du phénomène El Niño-Oscillation australe.

Le coin des spécialistes

Ouvrages

Reading Weather: The Field Guide to Forecasting the Weather. Jim Woodmencey. FalconGuide; n°2, 2012, 128 p. ISBN-13: 978-0762782369

“Reading Weather provides a quick and simple way to understand how the atmosphere works, how to interpret and use weather forecasts before venturing outdoors, and also how to make your own forecast in the field by observing the changes in the weather. This fully updated and revised reference will arm you with the meteorological knowledge necessary to make good decisions on whether to proceed or retreat in the face of a storm. Also included are helpful definitions, tables, and simplified graphics of common weather features.”

Spectral Numerical Weather Prediction Models. Martin Ehrendorfer. Cambridge University Press, 2012, 525 p. ISBN-13: 978-1611971989.

“This book provides a comprehensive overview of numerical weather prediction (NWP), focusing on the application of the spectral method in NWP models. The author illustrates the use of the spectral method in theory as well as in its application to building a full prototypical spectral NWP model, from the formulation of continuous model equations through development of their discretized forms to coded statements of the model. The author describes the implementation of a specific model – PEAK (Primitive-Equation Atmospheric Research Model Kernel) – to illustrate the steps needed to construct a global spectral NWP model. [...]”

Fundamentals of Numerical Weather Prediction. Jean Coiffier. Cambridge University Press, 2011, 368 p. ISBN-13: 978-1107001039.

“Numerical models have become essential tools in environmental science, particularly in weather forecasting and climate prediction. This book provides a comprehensive overview of the techniques used in these fields, with emphasis on the design of the most recent numerical models of the atmosphere. It presents a short history of numerical weather prediction and its evolution, before describing the various model equations and how to solve them numerically. It outlines the main elements of a meteorological forecast suite, and the theory is illustrated throughout with practical examples of operational models and parameterizations of physical processes. [...]”

Forecast Verification: A Practitioner's Guide in Atmospheric Science. Ian T. Jolliffe, David B. Stephenson. 2011, 2nd Edition, 292 p. ISBN: 978-0-470-66071-3.

“This book provides an indispensable guide to this area of active research by combining depth of information with a range of topics to appeal both to professional practitioners and researchers and postgraduates. The editors have succeeded in presenting chapters by a variety of the leading experts in the field while still retaining a cohesive and highly accessible style. The book balances explanations of concepts with clear and useful discussion of the main application areas.”

Weather Prediction by Numerical Process. Lewis Fry Richardson, Peter Lynch. Forgotten Books, 2010, 254 p. ISBN-13: 978-1440089961.

“The idea of forecasting the weather by calculation was first dreamt of by Lewis Fry Richardson. He set out in this book a detailed algorithm for systematic numerical weather prediction. The method of

computing atmospheric changes, which he mapped out in great detail in this book, is essentially the method used today. He was greatly ahead of his time because, before his ideas could bear fruit, advances in four critical areas were needed: better understanding of the dynamics of the atmosphere; stable computational algorithms to integrate the equations; regular observations of the free atmosphere; and powerful automatic computer equipment. [...].”

Disponible Service IST Inria (édition 2007)

Handbook of numerical analysis. XIV, Special vol. : computational methods for the atmosphere and the oceans. P.G. Ciarlet. Elsevier, 2009, 761 p. ISBN 978-0-444-51893-4.

“This book provides a survey of the frontiers of research in the numerical modeling and mathematical analysis used in the study of the atmosphere and oceans. The details of the current practices in global atmospheric and ocean models, the assimilation of observational data into such models and the numerical techniques used in theoretical analysis of the atmosphere and ocean are among the topics covered : Truly interdisciplinary: scientific interactions between specialties of atmospheric and ocean sciences and applied and computational mathematics, Uses the approach of computational mathematicians, applied and numerical analysts and the tools appropriate for unsolved problems in the atmospheric and oceanic sciences [...].”

Disponible Service IST Inria

Empirical methods in short-term climate prediction. Van den Dool, Huug. Oxford University Press, 2007, 215 p. ISBN 978-0-19-920278-2.

“This clear and accessible text describes the methods underlying short-term climate prediction at time scales of 2 weeks to a year. Although a difficult range to forecast accurately, there have been several important advances in the last ten years, most notably in understanding ocean-atmosphere interaction (El Nino for example), the release of global coverage data sets, and in prediction methods themselves. With an emphasis on the empirical approach, the text covers in detail empirical wave propagation, teleconnections, empirical orthogonal functions, and constructed analogue. It also provides a detailed description of nearly all methods used operationally in long-lead seasonal forecasts, with new examples and illustrations. [...].”

Disponible Service IST Inria

Ouvrages à paraître.

Weather Modeling and Forecasting of Pv Systems Operation. Marius Paulescu, Eugenia Paulescu, Paul Gravila, Viorel Badescu. Springer, 2012, 400 p. ISBN-13: 978-1447146483.

“In the past decade, there has been a substantial increase of grid-feeding photovoltaic applications, thus raising the importance of solar electricity in the energy mix. This trend is expected to continue and may even increase. Apart from the high initial investment cost, the fluctuating nature of the solar resource raises particular insertion problems in electrical networks. Proper grid managing demands short- and long-time forecasting of solar power plant output. Models for predicting the state of the sky, nowcasting solar irradiance and forecasting solar irradiation are studied and exemplified. Statistical as well as artificial intelligence methods are described. The efficiency of photovoltaic converters is assessed for any weather conditions. “

Ouvrage à paraître (novembre 2012)

The Social Life of Climate Change Models: Anticipating Nature. Kirsten Hastrup , Martin Skrydstrup. Routledge, 2012, 256 p. ISBN-13: 978-0415628587.

“Drawing on a combination of perspectives from diverse fields, this volume offers an anthropological study of climate change and the ways in which people attempt to predict its local implications, showing how the processes of knowledge making among lay people and experts are not only comparable but also deeply entangled. Through analysis of predictive practices in a diversity of regions affected by climate change – including coastal India, the Cook Islands, Tibet, and the High Arctic, and various domains of scientific expertise and policy making such as ice core drilling, flood risk modelling, and coastal adaptation – the book shows how all attempts at modelling nature’s course are deeply social, and how current research in "climate" contributes to a rethinking of nature as a multiplicity of modalities that impact social life.”

Ouvrage à paraître (novembre 2012)

An Introduction to Dynamic Meteorology. James R. Holton, Gregory J. Hakim. Academic Press, 5th Revised edition, 2012, 552 p. ISBN-13: 978-0123848666.

“This new edition of James Holton's bestselling textbook--now with lead author Gregory Hakim--introduces upper undergraduate and graduate-level students to the study of atmospheric behavior and dynamics impacted by weather and climate.”

Ouvrage à paraître (octobre 2012)

Operational Weather Forecasting. Peter Michael Inness, Bob Riddaway, Steve Dorling. Wiley-Blackwell, 2013, 248 p. ISBN-13: 9780470711590.

“This book is an accessible introduction to the practice of operational weather forecasting, and describes the end-to-end process of forecasting, from gathering and processing observational data, through data assimilation and running a numerical model, to the production of forecasts for end users. It discusses the latest advances in the area, including ensemble methods, monthly to seasonal range prediction and use of nowcasting tools such as radar and satellite imagery. In full colour throughout and written by a highly respected team of authors with experience in both academia and practice, this book is an ideal addition to the RMetS Advancing Weather and Climate Science Series.”

Ouvrage à paraître (janvier 2013)

Revue scientifique

Tellus, A: Dynamic Meteorology and oceanography. International meteorological institute in Stockholm, ISSN 1600-0870, <<http://www.tellusa.net/index.php/tellusa>>, [accédé le 12 septembre 2012].

“*Tellus A* aims to provide a broad forum for researchers across a number of scientific disciplines to communicate recent discoveries and novel theories about the research and theory on dynamics of the atmosphere and the ocean. This series encompasses dynamic meteorology, physical oceanography, data assimilation techniques, numerical weather prediction, climate dynamics, and climate modelling.”

Quarterly Journal of the Royal Meteorological Society. Wiley, ISSN 1477-870X, <[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1477-870X](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1477-870X)>, [accédé le 12 septembre 2012].

“The Quarterly Journal is acknowledged as one of the world’s leading meteorological journals and contains papers, notes and correspondence by leading meteorologists presenting the results of their research. This includes original research in the atmospheric sciences, applied meteorology and physical oceanography in a journal which is published eight times a year with additional special issues. Comprehensive review articles, short articles describing minor investigations, or comments on published papers are also considered.”

Monthly Weather Review, MWR, AMS, ISSN 1520-0493, <<http://journals.ametsoc.org/loi/mwre>>, [accédé le 12 septembre 2012]

“Research results relevant to the analysis and prediction of observed atmospheric circulations and physics, including technique development, data assimilation, model validation, and relevant case studies. This includes papers on numerical and data assimilation techniques that apply to the atmosphere and/or ocean environments as well as socioeconomic analyses of the impacts of weather and weather forecasts. MWR focuses on phenomena having seasonal and subseasonal time scales. Reviews of climatological aspects of high-impact events such as hurricanes, as well as review articles, are occasionally published. »

Qualité de l'air.

Ouvrages

Pollution atmosphérique : des processus à la modélisation. Bruno Sportisse Springer, 2008, 345 p. ISBN 978-2-287-74961-2.

“Qualité de l'air, effet de serre, trou d'ozone, accidents chimiques ou nucléaires... Tous ces sujets ont en commun d'être étroitement liés à la composition chimique de l'atmosphère et à la dispersion atmosphérique de polluants. Cet ouvrage a pour objectif de donner les principaux éléments de compréhension des « pollutions atmosphériques ». Quels sont les enjeux ? Quels sont les processus physiques impliqués ? Quel rôle joue à présent l'expertise scientifique, fondée notamment sur la modélisation, pour l'aide à la décision ? [...]”

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Energies nouvelles

Ouvrages

Planning for a New Energy and Climate Future. Scott Shuford. APA Planners Press, 2010, 160 p. ISBN-13: 978-1932364767.

“Planning for a New Energy and Climate Future, the culmination of a three-year research and education project on the integration of climate change and energy issues into planning practice, was prepared by APA in collaboration with the Environmental and Energy Study Institute (EESI), the National Oceanic and Atmospheric Administration, and the University of North Carolina Asheville. The report presents fundamental information about energy and climate change, provides a framework for how to integrate energy and climate into the planning process, and offers strategies for communities to address energy and climate across a variety of issues, including development patterns, transportation, and economic development.”

Outils et applications

SER - Syndicat des énergies renouvelables, <<http://www.enr.fr/>>, [accédé le 12 septembre 2012].

« Le Syndicat des énergies renouvelables est l'organisation industrielle française des énergies renouvelables et regroupe l'ensemble des secteurs : biomasse (France Biomasse Energie), bois énergie, biocarburants, énergies marines, éolien, géothermie, hydroélectricité, pompes à chaleur, solaire photovoltaïque (SOLER), solaire thermique et thermodynamique. »

Equipes de recherche Inria

CLIME <<https://www.rocq.inria.fr/clime/>>, [accédé le 12 septembre 2012].

« L'équipe-projet Clime effectue des travaux dans trois directions principales, les deux premières à vocation "recherche", la troisième visant à faciliter le transfert vers les applications : Assimilation de données et modélisation inverse, Assimilation d'images, Chaînes logicielles pour les applications environnementales. »

MOISE <<http://team.inria.fr/moise/>>, [accédé le 12 septembre 2012].

« Equipe-projet de recherche en mathématiques appliquées et calcul scientifique centrée sur le développement de méthodes mathématiques et numériques pour la modélisation directe et inverse en sciences de l'environnement (fluides géophysiques principalement). Le cadre scientifique de cette équipe-projet est la conception de systèmes complexes de prévision, notre but étant de contribuer à perfectionner ces systèmes, tout particulièrement dans les domaines environnementaux : changement climatique, systèmes de prévision atmosphérique et océanique régionale, outils d'aide à la décision dans le domaine des crues, avalanches, coulées de boue ou de lave. »

STEEP <<http://steep.inrialpes.fr/>>, [accédé le 12 septembre 2012].

"Is devoted to systemic modelling and simulation of the interactions between the environmental, economic and social factors in the context of transition to sustainability at local (sub-national) scales. Its objective is to set up some mathematical and computational tools to develop decision-making tools."

TOSCA <<http://www-sop.inria.fr/tosca/>>, [accédé le 12 septembre 2012].

« Joint project-team between INRIA and the University Henri Poincaré, CNRS, University Nancy 2 and INPL, located in the Institut Elie Cartan (IECN) in Nancy and in the Research Center INRIA of Sophia Antipolis. Research themes: Transverse problems, Long time simulations for nonlinear PDEs., Simulations of multivalued models., Variance reduction techniques., Stochastic partial differential equations., Stochastic models in Neurosciences and Biology, Stochastic models in Finance, Stochastic models in Fluid Mechanics and Meteorology, Stochastic models in Chemical Kinetics, Softwares, numerical experiments. »

Sociétés

ARIA Technologies <http://www.aria.fr/>, [accédé le 12 septembre 2012].

« ARIA Technologies se consacre exclusivement, depuis sa création en 1990, à l'étude de l'environnement atmosphérique, et en particulier à la simulation numérique de la dispersion des polluants atmosphériques. »

CLIMPACT <<http://www.climpact.com/>>, [accédé le 12 septembre 2012].

« CLIMPACT est un essaimage de l'Institut Pierre-Simon-Laplace des Sciences de l'Environnement. Partant du constat que 70% de l'économie est « météo-sensible », CLIMPACT s'appuie sur l'expertise d'une équipe de 23 personnes pour proposer son offre, Weather Competitivity Services permettant aux entreprises de convertir, pour chacun de leurs produits ou services, les fluctuations météorologiques en avantages compétitifs. »

FLUYDIN < <http://www.fluidyn.com/>>, FLUIDYN développe et commercialise des logiciels de simulation numérique 3D basés sur la mécanique des fluides et produit des études et de la R&D dans le domaine de l'environnement, des risques et des procédés.

METECONSULT <<http://france.meteoconsult.fr/>>, [accédé le 12 septembre 2012].

« L'assistance Météo en direct ».

METEOFRACTANCE <<https://public.meteofrance.com/>>, [accédé le 12 septembre 2012].

« Météo-France produit et diffuse quotidiennement un très grand volume d'informations dans le cadre de ses missions de service public.... »

METEOGROUP <<http://www.meteogroup.fr/home.html>>, [accédé le 12 septembre 2012].

« Est la plus grande entreprise de services météorologiques privée d'Europe ».

METNEXT <<http://www.metnext.com/>>, [accédé le 12 septembre 2012].

« Société spécialisée dans : la gestion de la météo-sensibilité des entreprises (secteurs de l'énergie, de la grande distribution, du tourisme ...). Elle propose des solutions opérationnelles qui permettent aux entreprises d'identifier, quantifier, gérer et couvrir leur météo-sensibilité à court, moyen ou long terme ».

NOVELTIS <<http://www.noveltis.com/>>, [accédé le 12 septembre 2012].

« En synergie avec ses activités spatiales, NOVELTIS a développé des outils et des méthodes pour la caractérisation et le suivi de phénomènes environnementaux ».

NUMTECH <<http://www.numtech.fr/>>, [accédé le 12 septembre 2012].

« Intervient dans le monde entier pour étudier la dispersion atmosphérique de rejets liés à l'activité humaine, réaliser et prévoir la qualité de l'air ou expertiser des événements météorologiques. »